provide a final laminate (Fig. 8 (a)).

(5) Then, the above laminate was degreased in nitrogen gas at 600°C for 5 hours and hot-pressed at a temperature of 1890°C and a pressure of 150 kg/cm$^2$ for 3 hours to provide an aluminum nitride ceramic plate having a thickness of 3 mm. From this plate, a disk with a diameter of 300 mm was cut out to provide an aluminum nitride ceramic disk internally having a 6 $\mu$m-thick × 10 mm-wide resistance heating element 5, a 10 $\mu$m-thick chuck positive electrode static layer 2 and a 10 $\mu$m-thick chuck negative electrode static layer 3 (Fig. 8 (b)).

(6) Then, after the plate obtained in (5) was polished with a diamond grinding wheel, a mask was placed in position and blind holes (1.2 mm in diameter and 2.0 mm deep) for accepting thermocouples were formed on the surface of the mask by blasting via SiC and so forth.

(7) Then, the parts where the plated-through holes have been formed are bored to provide blind holes 13, 14 (Fig. 8 (c)), and in these blind holes 13, 14, an Ni-Au brazing material was filled and allowed to reflow under heating at 700°C to connect external terminals 6, 18 made of Koval® (Fig. 8 (d)).

The preferred mode of connection of the external terminals is the 3-point tungsten support system which provides for improved reliability of connection.

(8) Then, a plurality of thermocouples for temperature control were embedded in said blind holes to complete the manufacture of an electrostatic chuck equipped with a resistance heating element.

The oxygen content of the ceramic substrate forming the above electrostatic chuck having a resistance heating element was measured. In addition, the resistance heating element of the ceramic substrate was energized to increase the ceramic substrate temperature to 400°C.

As a result, no leak current was observed and the temperature rise time up to 400°C was 50 seconds.

Example 3

Manufacture of a wafer prover 201 (Fig. 6)

(1) A composition prepared by mixing 1000 weight parts of aluminum nitride powder (product of Tokuyama; average particle diameter 1.1 μm), 40 weight parts of yttria (average particle diameter 0.4 μm), $1.3 \times 10^{-3}$ weight part of boron nitride and 530 weight parts of alcohol consisting of 1-butanol and ethanol was molded by the doctor blade technique to prepare green sheets having a thickness of 0.47 mm.

(2) Then, these green sheets were dried at 80°C for 5 hours and formed with punched holes for plated-through holes for connecting the heating element to the external terminal pins.

(3) A conductive paste A was prepared by mixing 100 weight parts of a tungsten carbide powder having an average particle diameter of 1 μm, 3.0 weight parts of acrylic binder, 3.5 weight parts of α-terpineol as solvent, and 0.3 weight part of dispersant.

A conductive paste B was similarly prepared by mixing 100 weight parts of tungsten powder having an average particle diameter of 3 μm, 1.9 weight parts of acrylic binder, 3.7 weight parts of α-terpineol as solvent, and 0.2 weight part of dispersant.

The green sheet was printed with the above conductive paste A by the screen printing technique to provide a guard electrode in a grid form and a ground electrode.

In addition, the conductive paste B was filled into the holes for plated-through holes for connection to the terminal pins.

Then, 50 units of the printed green sheet and unprinted green sheets were stacked in superimposition

and hot-pressed at 130°C and 80 kg/cm$^2$ to provide a unified laminate.

(4) This laminate was degreased in nitrogen gas at 600°C for 5 hours and, then, hot-pressed at a temperature of 1890°C and a pressure of 150 kg/cm$^2$ for 3 hours to provide a 3 mm-thick aluminum nitride ceramic plate. From this plate, a disk having a diameter of 300 mm was cut out to provide a ceramic disk. The size of plated-through holes 16 was 0.2 mm in diameter and 0.2 mm in depth.

The thickness of the guard electrode 45 and ground electrode 46 was 10 $\mu$m. The position of the guard electrode 45 was 1 mm from the wafer-supporting surface and the position of the ground electrode 46 was 1.2 mm from the wafer-supporting surface. The dimension per side of the conductor-free areas 46a of the guard electrode 45 and ground electrode 46 was 0.5 mm.

(5) After the plate obtained in (4) above was polished with a diamond grinding wheel, a mask was placed in position and the cavities for thermocouples and the wafer-attracting suction grooves 47 (0.5 mm wide, 0.5 mm thick) were provided on the surface of the mask by blasting via SiC and so forth.

(6) Then, a layer to form a heating element 49 was formed by printing the surface opposite to the wafer-supporting surface. This printing was performed using a conductive paste. As the conductive paste, Solbest PS603D available from Tokuriki Kagaku Kenkyusho for use in the formation of plated-through holes in printed circuit boards was used. The conductive paste mentioned above was a silver-lead paste containing, based on 100 weight parts of silver, 7.5 weight parts of metal oxide consisting of lead oxide, zinc oxide, silica, boron oxide and alumina (in a weight ratio of 5/55/10/25/5, in the order mentioned).

The silver powder used was a flaky powder having an average particle diameter of 4.5 $\mu$m.